Ground Water Recharge Activities
In Santa Clara Valley
June 25, 1959
Santa Clara Valley Water Conservation
District/John H Clarke

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GROUND WATER RECHARGE ACTIVITIES

IN

SANTA CLARA VALLEY, CALIFORNIA

by

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A PAPER PRESENTED ON JUNE 25, 1959, AT THE BIENNIAL CONFERENCE ON GROUND WATER RECHARGE, BERKELEY, BY JOHN H. CLARKE, HYDROGRAPHIC ENGINEER, SANTA CLARA VALLEY WATER CONSERVATION DISTRICT, 15420 ALMADEN ROAD, SAN JOSE 24, CALIFORNIA.

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GROUND WATER RECHARGE ACTIVITIES
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INTRODUCTION

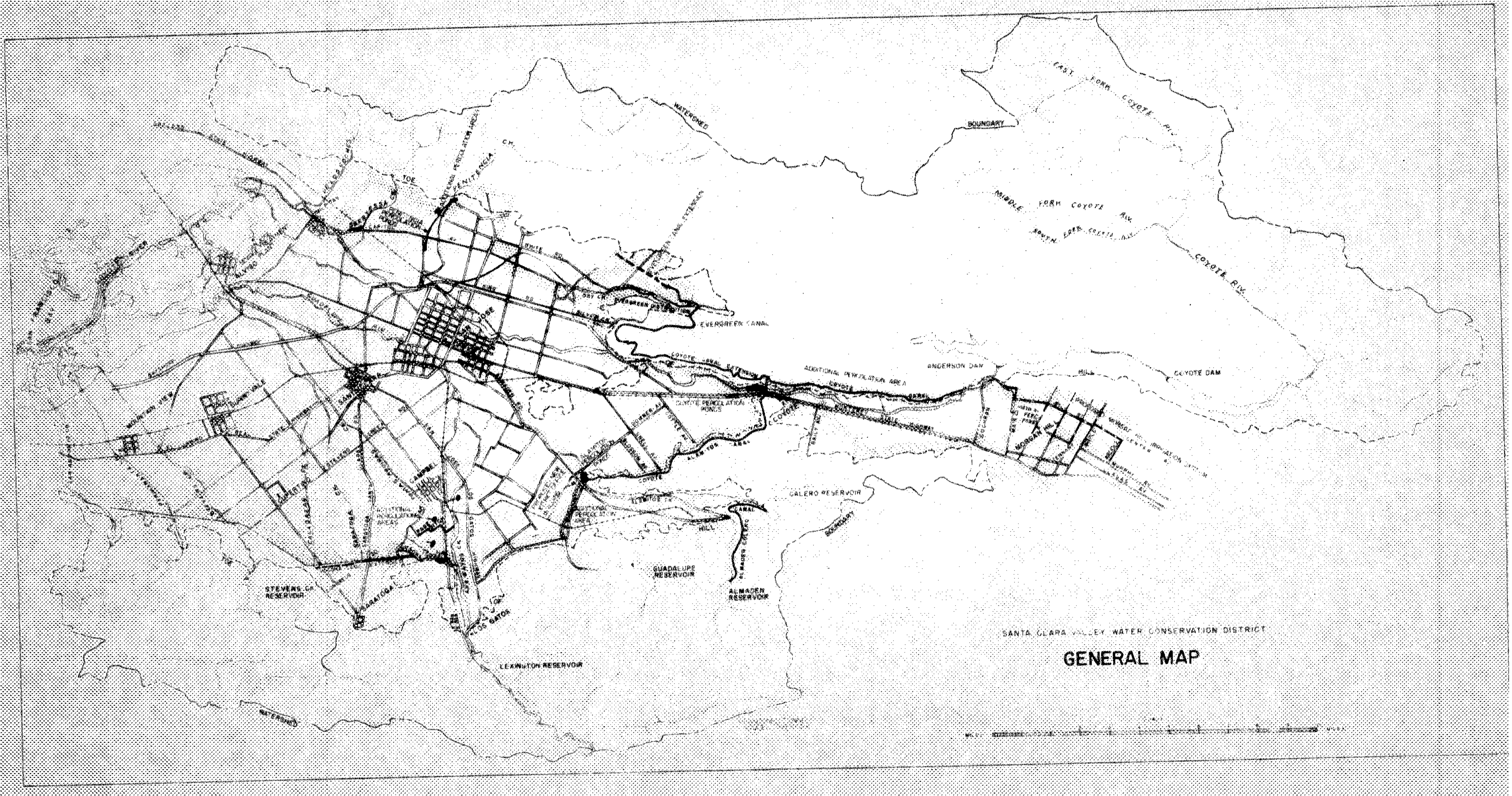
The Santa Clara Valley Water Conservation District was organized by a 90% majority vote of the people on November 12, 1929. Basically, the purpose of the District is to conserve waste waters and make this water available to all within boundaries of the District. This is accomplished by capturing the waste waters from the winter rains and impounding them, temporarily, in storage reservoirs for later release and subsequent percolation into the underground water basin.

The boundaries of the District follow the extent of the underground water basin, the lands over which would benefit from the works of the District. The District extends on the north to Adobe or San Antonio Creek north of Mountain View, on the east and west to the foothills, and on the south to just south of Morgan Hill. The District encompasses some 155,880 acres. (General map of the District is attached.)

HISTORY OF GROUND WATER LEVEL FLUCTUATION

Santa Clara Valley is very fortunate in having a natural underground reservoir where water can be stored for use of the valley's inhabitants and safe from salt water intrusion from San Francisco Bay.

The attached chart shows the fluctuation of the water level in Santa Clara Valley since 1909. Prior to the turn of the century, there was very little irrigation in Santa Clara Valley. Shortly after the beginning of the century, agricultural development started and has increased rapidly

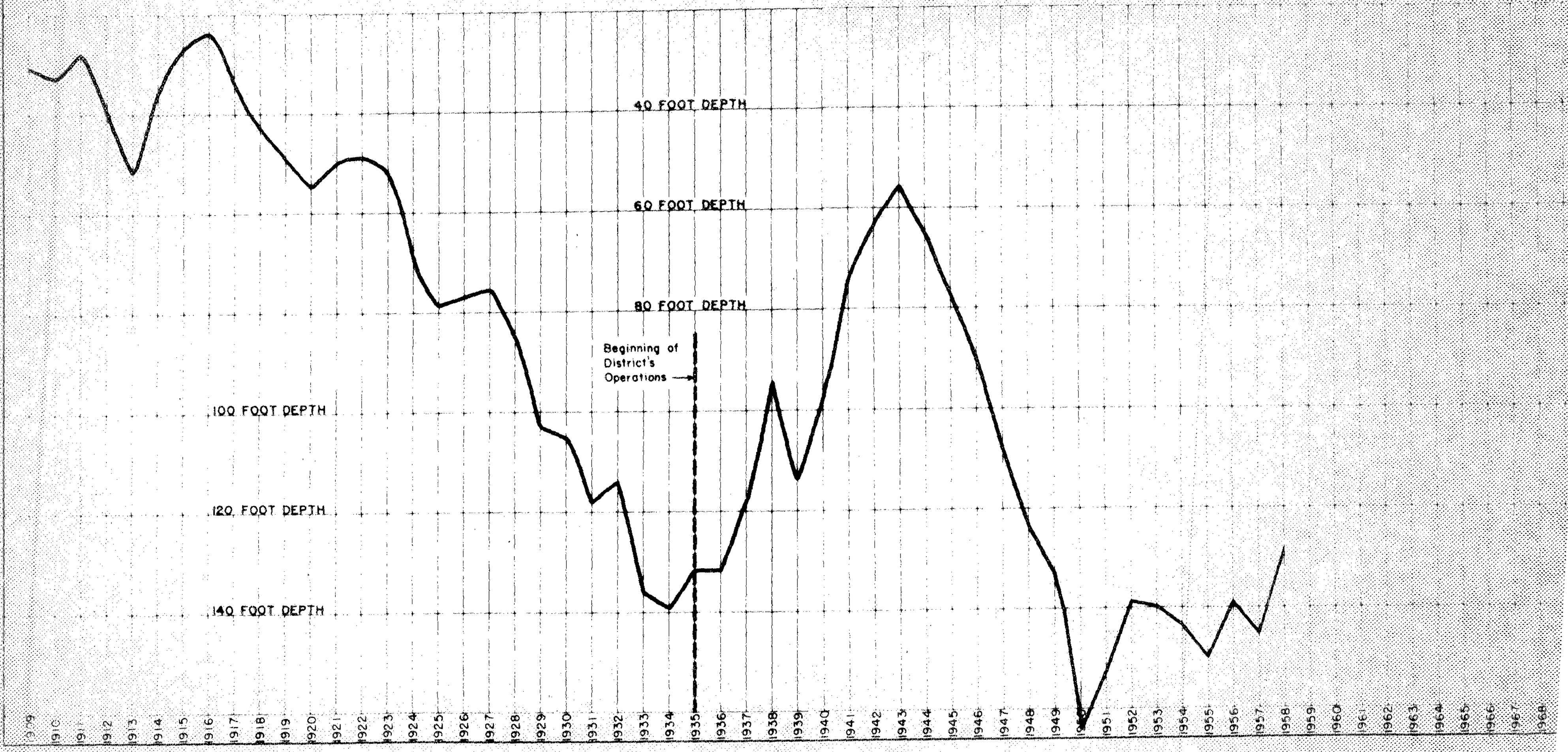


SANTA CLARA VALLEY WATER CONSERVATION DISTRICT

GENERAL MAP

SANTA CLARA VALLEY WATER CONSERVATION DISTRICT

AVERAGE DEPTH TO WATER AT END OF IRRIGATION SEASON



ever since. Starting in 1909, the average depth to water in the Valley was about 40 feet. From 1909 to 1918 there were normal fluctuations from year to year.

In 1918, agricultural production increased, coupled with a prolonged dry spell, with the result that the water level dropped about 100 feet by 1934.

The Santa Clara Valley Water Conservation District was formed in 1929. In 1935, five dams were built: one on the Coyote, one at Calero, one at Almaden, one at Guadalupe and one at Stevens Creek. The combined capacity of these reservoirs was 43,921 acre-feet. These went into operation in 1936. From 1936 to 1943, the average water level rose about 80 feet. However, part of this rise can be attributed to entering a wet cycle at that time and the other part can be credited to the District's operation. We entered another dry cycle in 1943, along with an increased use of water. The water level again dropped very rapidly. By 1950, a new all-time low was reached - an average depth to water of 165 feet. To meet this crisis, the District built a second dam on the Coyote, Leroy Anderson Dam, in 1950, with a storage capacity of 75,000 acre-feet. In 1952, the Lexington Dam on Los Gatos Creek was constructed with a capacity of over 21,475 acre-feet. As a result, the total storage capacity available for capturing winter flood waters is 140,396 acre-feet.

From 1950 to the present, the average water level has started back on an upward trend. During this period, alternate wet and dry years have been experienced.

NEW APPURTENANCES AID DISTRIBUTION AND PERCOLATION

Water stored in reservoirs does not help the user until such time as it is percolated into the underground aquifers. Since the new Lexington and Anderson Dams increased the District's reservoir storage capacity by some three times the problem was to transport this water to some of the existing 100 acres of percolation areas. In 1953, the nine-mile long Coyote-Alamitos Canal was constructed to transport water westward from the Coyote Creek to Guadalupe Creek. At the same time, a pumping plant and pipeline were installed to transport water westward from Los Gatos Creek to San Tomas and Saratoga Creeks. In 1954, the Evergreen Canal was constructed for the purpose of supplying water to an area which had been included in the District a short time before because it was having serious water problems.

Since 1954, the use of water in Santa Clara Valley continued to increase as a result of the ever increasing urban and industrial growth. It became apparent that a new program of acquisition and construction to provide for future needs must begin. On March 26, 1957, the people voted the successful passage of a $3,000,000 bond issue to provide funds for such a program. Half of these funds were earmarked for the purchase and development of additional percolation areas. The other half was for increasing the capacity of and expanding the existing distribution system.

SELECTION AND DEVELOPMENT OF NEW PERCOLATION AREAS

As provided in the recent 7th Bond Issue, approximately 400 acres of new percolation areas were to be acquired.

The selection of the sites for the acquisition of new percolation or spreading areas was based on many factors. First, all of the District's well level records were analyzed to determine where the greatest need for water existed in the underground water basin. Next, all of the District's percolation records were studied to see what existing stream beds could be developed into spreading areas. Consideration was also given to possible enlargement of the present spreading areas. An exhaustive effort was made, with much success, to gather well log data from local well drilling firms and well owners. This well log data was used to locate the existence of, the proximity to the ground surface, the thickness, direction, and approximate quality of the gravel stratas. The logs, also, indicated how much overburden would have to be removed to expose the gravel. This knowledge aided in the location of off-stream spreading areas as well as verifying prospective stream-bed spreading areas. In areas where well log data was lacking, drilling was done by use of hand augers, power-driven test-hold augers or rotary well drilling rigs. In one area adjacent to the Coyote River, seismic exploration was used with success. Another consideration was the proximity of the prospective off-stream spreading area to present District canals or pipelines or stream-beds in order to, economically, convey water to the prospective spreading area. Land value was another consideration. The average land appraisal by the District's Right-of-Way Agent, plus the estimated cost of development of the spreading area, was $3,750 per acre. In some cases where the costs per acre were greater than the $3,750, this was offset by the District selling the gravel removed during the development of the spreading ponds. Contractors, while constructing the ponds, have paid the District as much as 36¢ per yard of gravel removed.

STATUS OF PERCOLATION AREA ACQUISITION

The following is the status of the acquisition of the new percolation areas:

Acres purchased to date ------------ 178 acres
Agreement of possession ------------ 24 acres
Under negotiation ----------------- 149 acres
Acreage to be selected ------------- 49 acres
Total ------- 400 acres

RESULTS OF PERCOLATION TESTS IN OLD AND PROPOSED PERCOLATION SITES

The following are some of the sustained percolation rates obtained during tests made for selection of the new percolation areas:

A. Penitencia Percolation Ponds ------- 5 ft./ac./day
B. Ford Road Area - Coyote River
    (1) Renzel ------- 7.5
    (2) Ferrari ------- 4.2
    ------- 6 ft./ac./day
C. Coyote Percolation Ponds ------- 2 ft./ac./day
D. McGlincey Ponds ------- 6 ft./ac./day
E. Los Gatos Creek at S.J./L.G. Rd.------ 12 ft./ac./day
F. Alamitos Percolation Ponds ------- 2 ft./ac./day
G. Guadalupe Percolation Ponds ------- 3 ft./ac./day
H. Main Avenue Percolation Ponds ------- 1.2 ft./ac./day

PROBLEMS INVOLVED WITH RECHARGE OPERATION

During operation of the District's existing percolation ponds, many problems had been encountered. One of the problems was the wave action of the water against the pond banks that contain a clayey gravel sluicing out the clay into suspension. The result is when the clay settles out to the bottom of the ponds, the percolation rate decreases. This problem was successfully solved by installation of log booms around the perimeter of the ponds to prevent the waves from reaching the banks.

Another problem is that during the Spring the water collected in the reservoirs is very muddy from the winter run-off. As a result, much precious time is lost waiting for the impounded waters to clear up through sedimentation in the reservoirs before releasing them for subsequent percolation. It was found that in the southern part of the State a relatively new deflocculating agent produced by the Dow Chemical Company, under the trade name of Separan, was used to remove the suspended clay solids from the water with much success. A test was conducted by Dow Chemical Company last Spring, adding varying amounts of Separan to the water leading from Anderson Reservoir to the Main Avenue Percolation Ponds. The test was successful in removing the suspended solids. One of the ponds was used as a settling pond to collect the "floc" formed during the Separan's arresting of the solids. The result of the test was that Dow Chemical Company predicted a cost of Separan plus application would be approximately 50¢ per acre-foot of water treated. The District is now making plans to use Separan for this purpose.

The District has also been confronted with the problem of the growth of algae and aquatic weed growth in the canals and percolation ponds. The effect of this growth is a reduction of the flow capacity of the canals and a reduction in the percolation rate in the ponds. This growth has been controlled by application of bluestone crystals. Application was made in the canals by hanging sacks containing the crystals at the ends of many of the canal culverts. The ponds were treated by means of towing sacks of crystals behind a motor boat. Inasmuch as some of the water in the canals is diverted for direct irrigation and to prevent any possible damage to crops, the District has refrained from using more effective algae and weed killers.

INVERTED WELLS

The District has done a limited amount of experimental work with inverted wells. Five experimental wells have been used. The rates of recharge have ranged from 50 to 100 gallons per minute. In conjunction with one of the wells, an experimental filter box was used. It consisted of a redwood box of rectangular dimensions of 3 x 3 x 10 feet connecting the inflow pipeline to the well. The box was filled with pea gravel varying in size from 1/4" at the inlet end to 3/4" at the outlet to the well. The filter box was very effective in controlling algae and removing suspended solids from inflow water to the well. Periodically, the filter gravel at the inlet end had to be replaced.

CONCLUSION

It is hoped that at the next biennial conference the Santa Clara Valley Water Conservation District will be able to report on the use of its new ground water recharge areas and improved methods of recharge.